PATENT ABSTRACTS OF JAPAN

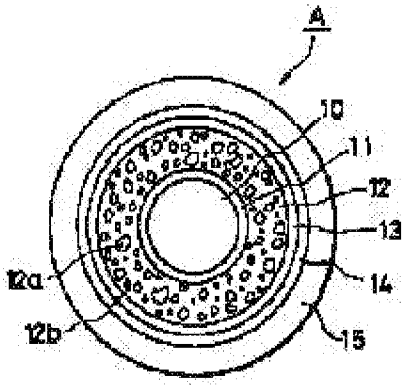
(11)Publication number : 07-235376
(43)Date of publication of application : 05.09.1995

(51)Int.Cl. H05B 33/00
E05B 33/00
H05B 33/10

(21)Application number : 06-024269
(22)Date of filing : 22.02.1994

(71)Applicant : YAZAKI CORP
(72)Inventor : HANANO NORIFUMI
OGURA HIROYUKI
SUGITA MASAYA

(54) WIRE FORM ELECTROLUMINESCENT ELEMENT AND ITS MANUFACTURE



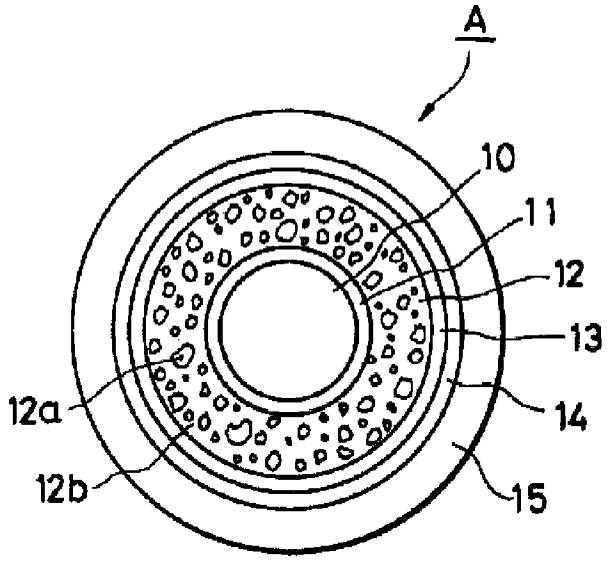
(57)Abstract:
PURPOSE: To provide a wire form electroluminescent element for use as a pointer of a gauge etc., which has a phosphor layer of organic substance dispersion type prepared by dispersing phosphor particles in an organic binder.
CONSTITUTION: A wire form electroluminescent element A is composed of an insulating layer 11 furnished at the periphery of a wire conductor 10, a phosphor layer 12 provided at the periphery of the insulating layer 11 and wherein phosphor particles 12a are dispersed in an organic binder 12b, and a transparent conductive film 14 furnished at the periphery of the phosphor layer 12. An inorganic intermediate layer 13 is provided between the phosphor layer 12 and transparent conductive film 14.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application]This invention is used for an light-emitting display raw material etc., and relates to a line EL emitter of suitable organicity distributed type, and a manufacturing method for the same, especially is used for an indicator etc., and relates to a suitable line EL emitter and a manufacturing method for the same.
[0002]
[Description of the Prior Art]The EL emitter of inorganic distributed type is known as an EL emitter using the conventional EL (electroluminescence) element. The EL element which made the dielectric of minerals like the clear glass of a multicomponent system distribute a fluorescent substance particle is used for an inorganic distributed EL emitter. However, since degradation of a fluorescent substance taking place in the process high temperature processing being performed, and the weight of a binder are heavy, when using it as an indicator of meter, this inorganic distributed EL emitter. Since it had big torque compared with the light guide type indicator manufactured from the acrylics etc., as an indicator, it was not suitable.
[0003]There is an EL emitter of organic distributed type which uses organic resin, such as cyanoethyl cellulose, for the dielectric which distributes a fluorescent substance particle as a method of solving this. Since there being little degradation of a fluorescent substance since low temperature treatment's is possible, and a binder are resin, the EL emitter of this organicity distributed type is a thing with advantages, such as that weight is made lightly and being high-intensity since the dielectric of high permittivity can be used comparatively.
[0004]When the EL emitter of this organicity distributed type is explained using drawing 2, the numerals 1 in a figure are metal substrates which carry out the duty of an electrode, Without carrying out a dielectric breakdown to the upper part of this metal substrate 1, the insulating layer 2 for impressing an electrode stably is formed, and the fluorescent substance layer 3 which distributed the fluorescent substance particle in organic dielectrics, such as cyanoethyl cellulose, is formed in the upper part of this insulating layer 2. The transparent electrode 4 used as the metal substrate 1 and a pair is formed, the protective layers 5, such as a glass substrate and a film, are formed in the upper part of this transparent electrode 4, and the upper part of the fluorescent substance layer 3 is made to emit light by applying a volts alternating current between the metal substrate 1 and the transparent electrode 4.
[0005]And in EL emitter A of organic distributed type, when forming the transparent electrode 4 in the upper part of the fluorescent substance layer 3, the method of producing a film is used by pasting together to the fluorescent substance layer 3 the transparent electrode 4 which produced the transparent conducting film beforehand to the glass

substrate or the transparent resin film.
[0006]
[Problem(s) to be Solved by the Invention]However, if it is in the EL emitter of organic distributed type of the above-mentioned former, when forming the transparent electrode 4 in the upper part of the fluorescent substance layer 3, the method of producing a film by pasting together to the fluorescent substance layer 3 the transparent electrode 4 which produced the transparent conducting film beforehand to the glass substrate or the transparent resin film is used, but. It is dramatically difficult to apply this manufacturing method to the line EL emitter used for an indicator etc.
[0007]In order to solve this, how to produce the transparent conducting film 4 directly to the fluorescent substance layer 3 of an indicator can be considered, but since organic resin is contained in the transparent conducting film 4, low temperature treatment 200 ** or less is needed. As that to which this is satisfied, how (physical method) to produce a film by weld slag, vacuum evaporation, etc. and the method (the chemical method) of producing a film by applying the solution which distributed the ITO ultrafine particle uniformly to the organic solvent, and drying can be considered.
[0008]However, in the case of the former, if it was in these methods, when adhesion was bad and the latter, there was a problem that the solvent of coating liquid will dissolve the binder of the internal fluorescent substance layer 3.
[0009]This invention is made in order to solve the above-mentioned problem, and in line EL emitters, such as an indicator, there is in providing the line EL emitter which the fluorescent substance layer of organic distributed type which distributed the fluorescent substance particle in the organic binder does not dissolve with the organic solvent of a transparent conducting film.
[0010]
[Means for Solving the Problem]An insulating layer provided in a periphery of a line conductor in order that this invention might solve the above-mentioned problem, It is the line EL emitter provided with a fluorescent substance layer which is provided in a periphery of this insulating layer and made an organic binder distribute a fluorescent substance particle, and a transparent conducting film provided in a periphery of this fluorescent substance layer, and is characterized by providing an inorganic interlayer between said fluorescent substance layer and a transparent conducting film.
[0011]The line EL emitter according to claim 2 is the fluorescent substance layer of organic distributed type which said fluorescent substance layer made distribute a fluorescent substance particle in a transparent binder, Said transparent conducting film distributes a conductive particle in an organic solvent, and it is characterized by forming said interlayer of a silica-coding agent.
[0012]A manufacturing method of the line EL emitter according to claim 3, A fluorescent substance layer is formed by applying a fluorescent substance particle which a periphery of an insulating layer provided with a metal stick as a core material was made to distribute in an organic binder, It is characterized by having formed an interlayer and forming a transparent conducting film by applying a conductive particle which a periphery of this interlayer was made to distribute in an organic solution by applying an inorganic material to a periphery of this fluorescent substance layer.
[0013]A manufacturing method of the line EL emitter according to claim 4 is characterized by said fluorescent substance layer's having pulled

up a line conductor formed in a periphery after ********, and said insulating layer making it produce in binder liquid which distributed Silvania 729 as a fluorescent substance particle in a damp-proof high fluoro-resin.
[0014]A manufacturing method of the line EL emitter according to claim 5 is characterized by having pulled up a line conductor in which said fluorescent substance layer was formed after ******** to silica material, and said interlayer's having heated it for 30 minutes at 150 ** to it, and making it produce.
[0015]
[Function]Since the inorganic interlayer is formed between the fluorescent substance layer and the transparent conducting film, it is lost that a transparent conducting film carries out direct contact to a fluorescent substance layer, the organic binder of a fluorescent substance layer is not dissolved by the organic solvent inside a transparent conducting film, and film production of a transparent conducting film is attained at the periphery of a fluorescent substance layer.
[0016]
[Example]Hereafter, this invention is explained still in detail, referring to drawings.
[0017]Drawing 1 is a figure showing one example of the line EL emitter of this invention.
The numerals A in a figure are line EL emitters.
The electrode 10 which consists of a metal stick, i.e., a line conductor, is formed in the core material of line EL emitter A. As for this electrode 10, phi1mm and a stainless steel core material 70 mm in length are used, and the insulating layer 11 is formed in the peripheral face of the electrode 10. The insulating layer 11 makes organic dielectrics, such as cyanoethyl cellulose, cyanoethyl poval, cyanoethyl pullulan, distribute titanic acid BARYUUMU, and produces a film as about 10-30-micrometer thickness by pulling up the electrode 10 after ******** to this by using a predetermined solvent as a solution. Thickness is controlled with the viscosity of a solution, pull up velocity, etc. Top of Form



[Translation done.]
* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application]This invention is used for an light-emitting display raw material etc., and relates to a line EL emitter of suitable organicity distributed type, and a manufacturing method for the same, especially is used for an indicator etc., and relates to a suitable line EL emitter and a manufacturing method for the same.
[0002]
[Description of the Prior Art]The EL emitter of inorganic distributed type is known as an EL emitter using the conventional EL (electroluminescence) element. The EL element which made the dielectric of minerals like the clear glass of a multicomponent system distribute a fluorescent substance particle is used for an inorganic distributed EL emitter. However, since degradation of a fluorescent substance taking place in the process high temperature processing being performed, and the weight of a binder are heavy, when using it as an indicator of meter, this inorganic distributed EL emitter. Since it had big

torque compared with the light guide type indicator manufactured from the acrylics etc., as an indicator, it was not suitable.
[0003]There is an EL emitter of organic distributed type which uses organic resin, such as cyanoethyl cellulose, for the dielectric which distributes a fluorescent substance particle as a method of solving this. Since there being little degradation of a fluorescent substance since low temperature treatment's is possible, and a binder are resin, the EL emitter of this organicity distributed type is a thing with advantages, such as that weight is made lightly and being high-intensity since the dielectric of high permittivity can be used comparatively.
[0004]When the EL emitter of this organicity distributed type is explained using drawing 2, the numerals 1 in a figure are metal substrates which carry out the duty of an electrode, Without carrying out a dielectric breakdown to the upper part of this metal substrate 1, the insulating layer 2 for impressing an electrode stably is formed, and the fluorescent substance layer 3 which distributed the fluorescent substance particle in organic dielectrics, such as cyanoethyl cellulose, is formed in the upper part of this insulating layer 2. The transparent electrode 4 used as the metal substrate 1 and a pair is formed, the protective layers 5, such as a glass substrate and a film, are formed in the upper part of this transparent electrode 4, and the upper part of the fluorescent substance layer 3 is made to emit light by applying a volts alternating current between the metal substrate 1 and the transparent electrode 4.
[0005]And in EL emitter A of organic distributed type, when forming the transparent electrode 4 in the upper part of the fluorescent substance layer 3, the method of producing a film is used by pasting together to the fluorescent substance layer 3 the transparent electrode 4 which produced the transparent conducting film beforehand to the glass substrate or the transparent resin film.
[0006]
[Problem(s) to be Solved by the Invention]However, if it is in the EL emitter of organic distributed type of the above-mentioned former, when forming the transparent electrode 4 in the upper part of the fluorescent substance layer 3, the method of producing a film by pasting together to the fluorescent substance layer 3 the transparent electrode 4 which produced the transparent conducting film beforehand to the glass substrate or the transparent resin film is used, but. It is dramatically difficult to apply this manufacturing method to the line EL emitter used for an indicator etc.
[0007]In order to solve this, how to produce the transparent conducting film 4 directly to the fluorescent substance layer 3 of an indicator can be considered, but since organic resin is contained in the transparent conducting film 4, low temperature treatment 200 ** or less is needed. As that to which this is satisfied, how (physical method) to produce a film by weld slag, vacuum evaporation, etc. and the method (the chemical method) of producing a film by applying the solution which distributed the ITO ultrafine particle uniformly to the organic solvent, and drying can be considered.
[0008]However, in the case of the former, if it was in these methods, when adhesion was bad and the latter, there was a problem that the solvent of coating liquid will dissolve the binder of the internal fluorescent substance layer 3.
[0009]This invention is made in order to solve the above-mentioned problem, and in line EL emitters, such as an indicator, there is in providing the line EL emitter which the fluorescent substance layer of organic distributed type which distributed the fluorescent

substance particle in the organic binder does not dissolve with the organic solvent of a transparent conducting film.
[0010]
[Means for Solving the Problem]An insulating layer provided in a periphery of a line conductor in order that this invention might solve the above-mentioned problem, It is the line EL emitter provided with a fluorescent substance layer which is provided in a periphery of this insulating layer and made an organic binder distribute a fluorescent substance particle, and a transparent conducting film provided in a periphery of this fluorescent substance layer, and is characterized by providing an inorganic interlayer between said fluorescent substance layer and a transparent conducting film.
[0011]The line EL emitter according to claim 2 is the fluorescent substance layer of organic distributed type which said fluorescent substance layer made distribute a fluorescent substance particle in a transparent binder, Said transparent conducting film distributes a conductive particle in an organic solvent, and it is characterized by forming said interlayer of a silica-coding agent.
[0012]A manufacturing method of the line EL emitter according to claim 3, A fluorescent substance layer is formed by applying a fluorescent substance particle which a periphery of an insulating layer provided with a metal stick as a core material was made to distribute in an organic binder, It is characterized by having formed an interlayer and forming a transparent conducting film by applying a conductive particle which a periphery of this interlayer was made to distribute in an organic solution by applying an inorganic material to a periphery of this fluorescent substance layer.
[0013]A manufacturing method of the line EL emitter according to claim 4 is characterized by said fluorescent substance layer's having pulled up a line conductor formed in a periphery after ********, and said insulating layer making it produce in binder liquid which distributed Silvania 729 as a fluorescent substance particle in a damp-proof high fluoro-resin.
[0014]A manufacturing method of the line EL emitter according to claim 5 is characterized by having pulled up a line conductor in which said fluorescent substance layer was formed after ******** to silica material, and said interlayer's having heated it for 30 minutes at 150 ** to it, and making it produce.
[0015]
[Function]Since the inorganic interlayer is formed between the fluorescent substance layer and the transparent conducting film, it is lost that a transparent conducting film carries out direct contact to a fluorescent substance layer, the organic binder of a fluorescent substance layer is not dissolved by the organic solvent inside a transparent conducting film, and film production of a transparent conducting film is attained at the periphery of a fluorescent substance layer.
[0016]
[Example]Hereafter, this invention is explained still in detail, referring to drawings.
[0017]Drawing 1 is a figure showing one example of the line EL emitter of this invention.
The numerals A in a figure are line EL emitters.
The electrode 10 which consists of a metal stick, i.e., a line conductor, is formed in the core material of line EL emitter A. As for this electrode 10, phi1mm and a stainless steel core material 70 mm in length are used, and the insulating layer 11 is formed in the

peripheral face of the electrode 10. The insulating layer 11 makes organic dielectrics, such as cyanoethyl cellulose, cyanoethyl poval, cyanoethyl pullulan, distribute titanic acid BARYUUMU, and produces a film as about 10-30-micrometer thickness by pulling up the electrode 10 after ******** to this by using a predetermined solvent as a solution. Thickness is controlled with the viscosity of a solution, pull up velocity, etc.

[0018]The fluorescent substance layer 12 is formed in the periphery of the insulating layer 11, and this fluorescent substance layer 12 distributes the fluorescent substance particle 12a in the binder 12b of transparent resin. The weight ratio of the fluorescent substance particle 12a and the binder 12b is mixed by 30 percent of the fluorescent substance particle, and the rate of 70 percent of the binder. In this example, a damp-proof high fluoro-resin is used for Silvania 729 (blue-green) as a binder as a material of a fluorescent substance particle. As the film production method of the fluorescent substance layer 12, it is the same as that of the film production method of the insulating layer 12.

[0019]The inorganic interlayer 13 is produced on the outside of the fluorescent substance layer 12. Materials, such as silica (SiO_2), alumina (aluminum$_2O_3$), and titanium oxide (TiO_2), are used for the interlayer 13. As a producing-film method, although a sol gel process, a spreading thermal decomposition method, etc. are used, in this example, the core material by which the fluorescent substance layer 12 was formed in the peripheral face L6023 made from the Nissan chemicals is heated for 30 minutes at ****** and back 150 ** pulled up, and it is considered as silica membrane.

[0020]Spreading desiccation of the ITO ultrafine particle solution is carried out in the peripheral face of the interlayer 13, the transparent conducting film 14 is produced, the tunic of the damp-proof high fluoro-resin is carried out to the periphery of this transparent conducting film 14, and it is considered as the protective film 15.

[0021]If it is in line EL emitter A of this example constituted as mentioned above, Since the interlayer 13 of the minerals which consist of silica is formed between the fluorescent substance layer 12 and the transparent conducting film 14, The transparent conducting film 14 can be easily formed in the periphery of the fluorescent substance layer 12, and the solvent of the transparent conducting film 14 touches the fluorescent substance layer 12 directly, and the binder 12b of the fluorescent substance layer 12 will be melted [stop / **********].

[0022]Since all the layers are produced by the applying method, excel in mass production nature, according to the manufacturing method of the line EL emitter of this example, since it is about 150 ** or less altogether and can process further, degradation by the heat of a fluorescent substance particle decreases, and. Since the organic binder 12b with a high dielectric constant is used, it can be considered as a sharp high-intensity photogen. It seems that luminosity of a line EL emitter is not attenuated since inorganic silica membrane is very thin and water-white.

[0023]

[Effect of the Invention]Since the line EL emitter of this invention provided the inorganic interlayer between the fluorescent substance layer and the transparent conducting film, A transparent conducting film does not carry out direct contact to a fluorescent substance layer, and it becomes, without it seeming that the organic binder of a fluorescent substance layer dissolves with the organic solvent of a transparent conducting film, and it becomes possible to produce a transparent conducting film on the periphery of a

fluorescent substance layer. In the peripheral face of an inorganic interlayer, either a physical method or the chemical method can produce a film.
[0024]The line EL emitter according to claim 2 is transparent by silica coding of an interlayer, and the organic solvent of a conducting film is prevented from contacting the organic binder of a fluorescent substance layer.
[0025]The line EL emitter according to claim 3 can laminate a transparent conducting film on the periphery of a fluorescent substance layer, without an organic solvent dissolving the binder of a fluorescent substance layer, since the transparent conducting film was formed in an interlayer's periphery.
[0026]Since the line EL emitter according to claim 4 can produce a fluorescent substance layer by the applying method, can produce a film easily, and. Since a film is produced at the temperature of about 150 ** or less, a fluorescent substance particle does not deteriorate and it becomes possible to make thickness very thin, and it is sharp and high-intensity and a damp-proof high indicator can be realized.
[0027]Since the line EL emitter according to claim 5 formed the interlayer by the applying method, Since a film can be produced easily and can be produced at the temperature of about 150 ** or less, a fluorescent substance particle does not deteriorate, it becomes possible to make thickness very thin, and a sharp high-intensity indicator can be realized.

[Translation done.]